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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/727,226	11/30/2000	Shimon B. Scherzer	47586-P057US-10025576	3518

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EXAMINER	
NGUYEN, DAVID Q	

ART UNIT	PAPER NUMBER
2681	10

DATE MAILED: 06/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/727,226	SHIMON B. SCHERZER ET AL.	
	Examiner	Art Unit	
	David Q Nguyen	2681	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 May 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-64* is/are pending in the application.

4a) Of the above claim(s) *1-11 and 42-64* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *12-32 and 34-36* is/are rejected.

7)☒ Claim(s) *33 and 37-41* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4-5*.
4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 12-13,16,18-32,34 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsutsui et al (US 6385181 B1) in view of Reudink (US 5563610).

Regarding claim 12, Tsutsui et al disclose a wireless communication system providing adaptive beam forming in a transmit signal path, said system comprising: an array of antenna elements, wherein said array includes at least M spaced apart antenna elements (see figs. 1-3, 10-11,13-18 and abstract); signal reception circuitry providing discrete information with respect to each one of M orthogonal renditions of said first signal as determined from a composite receive signal of M orthogonal renditions of a first signal (see figs. 1-3, 10-11,13-18); channel estimator circuitry coupled to said signal reception circuitry and receiving said discrete information with respect to each one of said M orthogonal renditions of said first signal (see figs. 1-3, 10-11,13-18), wherein said channel estimator circuitry determines a spatial signature associated with said composite receive signal (see col. 7, line 37 to col. 16, line 67); and beam forming circuitry providing beam forming coefficients to be used in transmission of a second signal (see figs. 1-3, 10-11,13-18, col. 7, line 37 to col. 16, line 67), wherein said beam forming coefficients are determined as a function of a conjugate of said spatial signature (see col. 7, line 37 to col. 16,

line 67). Tsutsui et al do not mention signal transmission circuitry providing M orthogonal renditions of a first signal, wherein said signal transmission circuitry is coupled to said M spaced apart antenna elements to provide a different one of said M orthogonal renditions of said first signal to each of said M spaced apart antenna elements for radiation in said transmit signal path. However, Reudink discloses a signal transmission circuitry providing M orthogonal renditions of a first signal, wherein said signal transmission circuitry is coupled to said M spaced apart antenna elements to provide a different one of said M orthogonal renditions of said first signal to each of said M spaced apart antenna elements for radiation in said transmit signal path (see fig. 5). Therefore, It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the above teaching of Reudink to Tsutsui et al in order to improve transmission quality as well as the reception characteristic.

Regarding claim 13, the wireless communication system of Tsutsui et al in view of Reudink also discloses wherein at least one of said M spaced apart antenna elements comprises a column of antenna elements (see figs. 1-3, 10-11,13-18 of Tsutsui et al).

Regarding claim 16, the wireless communication system of Tsutsui et al in view of Reudink also discloses wherein M is 4 (see col. 7, lines 40-45 of Tsutsui et al).

Regarding claim 18, the wireless communication system of Tsutsui et al in view of Reudink also discloses wherein said first signal is a pilot signal (see figs. 1-3, 10-11,13-18 of Tsutsui et al).

Regarding claim 19, the wireless communication system of Tsutsui et al in view of Reudink also discloses wherein said pilot signal provides demodulation information for said second signal (see figs. 1-3, 10-11,13-18 of Tsutsui et al).

Regarding claim 20, the wireless communication system of Tsutsui et al in view of Reudink also discloses further comprising: pilot signal beam forming emulation circuitry coupled to said channel estimator circuitry, wherein said pilot signal beam forming emulation circuitry utilizes said spatial signature in combination with said discrete information with respect to each one of said M orthogonal renditions of said first signal to emulate said first signal having been transmitted using said beam forming coefficients, wherein said emulated first signal is utilized in demodulating said second signal (see col. 7, line 37 to col. 16, line 67 and figs. 1-3, 10-11,13-18 of Tsutsui et al).

Regarding claims 21-23, the wireless communication system of Tsutsui et al in view of Reudink also discloses wherein said orthogonal renditions of said first signal are derived from power dividing said first signal M ways and separately coding each of said M power divided first signals (see col. 7, line 37 to col. 16, line 67 and figs. 1-3, 10-11,13-18 of Tsutsui et al); wherein codes used in separately coding said M power divided first signals are orthogonal pseudo noise codes (see col. 7, line 37 to col. 16, line 67 and figs. 1-3, 10-11,13-18 of Tsutsui et al); wherein said pseudo noise codes are Walsh codes (see col. 7, line 37 to col. 16, line 67 and figs. 1-3, 10-11,13-18 of Tsutsui et al).

Regarding claims 24-25, the wireless communication system of Tsutsui et al in view of Reudink also discloses wherein said signal transmission circuitry provides said second signal to each of said M spaced apart antenna elements in signal components weighted according to said beam forming coefficients (see col. 7, line 37 to col. 16, line 67 and figs. 1-3, 10-11,13-18 of Tsutsui et al); wherein said first signal is provided to said M spaced apart antenna elements without beam forming processing and said second signal is provided to said M spaced apart

antenna elements with beam forming processing (see col. 7, line 37 to col. 16, line 67 and figs. 1-3, 10-11,13-18 of Tsutsui et al).

Regarding claims 26-29, the wireless communication system of Tsutsui et al in view of Reudink also discloses wherein said discrete information with respect to each one of said M orthogonal renditions of said first signal comprises power and phase information (see col. 7, line 37 to col. 16, line 67 and figs. 1-3, 10-11,13-18 of Tsutsui et al); wherein said discrete information with respect to each one of said M orthogonal renditions of said first signal is utilized by said channel estimator to provide M dimensional column vectors describing said spatial signature (see col. 7, line 37 to col. 16, line 67 and figs. 1-3, 10-11,13-18 of Tsutsui et al); wherein said beam former circuitry receives spatial signature information from N channel estimators and utilizes this spatial signature information to derive N*M dimensional column vectors (see col. 7, line 37 to col. 16, line 67 and figs. 1-3, 10-11,13-18 of Tsutsui et al); wherein said N*M dimensional column vectors are utilized to group subscriber units associated with said N channel estimators according to subscriber units which may receive simultaneous transmissions without substantial interference (see col. 7, line 37 to col. 16, line 67 and figs. 1-3, 10-11,13-18 of Tsutsui et al).

Regarding claims 30-32, the wireless communication system of Tsutsui et al in view of Reudink also discloses wherein said spatial signature includes a channel quality metric (see col. 7, line 37 to col. 16, line 67 and figs. 1-3, 10-11,13-18 of Tsutsui et al); wherein said channel quality metric estimates C/I and Doppler conditions of the channel (see col. 7, line 37 to col. 16, line 67 and figs. 1-3, 10-11,13-18 of Tsutsui et al); wherein said channel quality metric is

determined at least in part using a time correlation function (see col. 7, line 37 to col. 16, line 67 and figs. 1-3, 10-11,13-18 of Tsutsui et al).

Regarding claim 34, the wireless communication system of Tsutsui et al in view of Reudink also discloses receiver grouping logic, wherein said spatial signature is utilized by said receiver grouping logic to group ones of a plurality of receivers, one of which is associated with said spatial signature, to identify ones of said receivers which may receive simultaneous transmissions without causing substantial interference (see col. 7, line 37 to col. 16, line 67 and figs. 1-3, 10-11,13-18 of Tsutsui et al).

Regarding claim 36, the wireless communication system of Tsutsui et al in view of Reudink also discloses data rate determining logic, wherein a data rate utilized in transmission of said second signal is determined by said data rate determining logic as a function of channel quality information associated with said spatial signature (see col. 7, line 37 to col. 16, line 67 and figs. 1-3, 10-11,13-18 of Tsutsui et al).

2. Claims 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsutsui et al (US 6385181 B1) in view of Reudink (US 5563610) and further in view of Brookner et al (US 6104343).

Regarding claim 14, the wireless communication system of Tsutsui et al in view of Reudink does not disclose wherein said array of antenna elements comprises a planar phased array. However, Brookner et al disclose an array of antenna elements comprises a planar phased array (see col. 9, lines 53-58). Therefore, It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the above teaching of Brookner et al to the

system of Tsutsui et al in view of Reudink in order to provide a plurality of independently steered beams.

3. Claims 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsutsui et al (US 6385181 B1) in view of Reudink (US 5563610) and further in view of Sanford et al (US 5294939).

Regarding claim 15, the wireless communication system of Tsutsui et al in view of Reudink does not disclose wherein said array of antenna elements comprises a circular phased array. However, Sanford et al disclose said array of antenna elements comprises a circular phased array (see fig. 7 and 9; col. 4, lines 55-61). Therefore, It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the above teaching of Sanford et al to the system of Tsutsui et al in view of Reudink in order to be applied to omni sites.

4. Claims 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsutsui et al (US 6385181 B1) in view of Reudink (US 5563610) and further in view of Hall et al (US 5721554).

Regarding claim 17, the wireless communication system of Tsutsui et al in view of Reudink does not disclose 4 spaced apart antenna elements provide an antenna aperture of approximately 10 wavelengths.

However, Hall et al discloses 4 spaced apart antenna elements provide an antenna aperture of approximately 10 wavelengths (see abstract). Therefore, It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the above teaching of Hall et al to the system of Tsutsui et al in view of Reudink in order to design the system as desired.

Allowable Subject Matter

Claims 33 and 37-41 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claim 33, the wireless communication system of Tsutsui et al in view of Reudink does not disclose wherein said time correlation function comprises the equation Y.sub.k=C.sub.k(t).sup.H*C.sub.k(t=.tau.)/(abs(C.s- ub.k(t))*abs(C.sub.k(t+.tau.))), as specified in claim 33.

Regarding claim 37, the wireless communication system of Tsutsui et al in view of Reudink does not disclose wherein said spatial signature includes a channel condition metric Y.sub.k and said data rate is determined at least in part using the equation (Data-rate).sub.k=R.sub.k+L*abS(Y.sub.k), as specified in claim 37.

Regarding claim 38, the wireless communication system of Tsutsui et al in view of Reudink also disclose wherein said array of antenna elements, said signal transmission circuitry, and said beam forming circuitry are disposed at a base station location (see col. 7, line 37 to col. 16, line 67 and figs. 1-3, 10-11,13-18 of Tsutsui et al). the wireless communication system does not mention wherein said signal reception circuitry and said channel estimator circuitry are disposed at a subscriber unit location as specified in claim 38.

Claims 39-41 depend on claim 38. Therefore, they are objected.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Scherzer (US 6347234 B1) and Scherzer (US 6108565) teaches a practical way to enhance signal quality in both up and downlink of wireless point to muti-point CDMA service implements basic radio direction finding techniques to allow for optional diversity combining in an antenna array employing large number of elements.

Reudink (US 5563610) teaches narrow beam antenna systems with angular diversity.

Forssen et al (US 5615409) teaches a method and an apparatus for transmitting and receiving signals using two classes of channels.

Bar-Ness (US 6137785) teaches wireless mobile station receiver structure with smart antenna.

Wang et al (US 6167243) teach diversity combining in a communications system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Q Nguyen whose telephone number is 703-605-4254. The examiner can normally be reached on 8:30AM-5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Erika A Gary can be reached on 703-308-0123. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DN

David Nguyen

ERICA GARY
PATENT EXAMINER